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TRANSMISSION BELT
[Dendou beruto]

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Claim

For a transmission belt which is comprised of an endless chain formed by sequentially connecting multiple link plates by means of rocker pins and joint pins that mutually contact at and are capable of vibrating at their opposing faces that are arc-shaped in cross section, and multiple load blocks that are attached to the chain, and for which two or more types of rocker pins and joint pins, for which the radiuses of curvature of the opposing faces differ, are used, and for which an outside link plate of the link plates which form the chain has a press-fitting hole that allows a joint pin to be press-fitted, a transmission belt characterized in that one type of said outside link plate, which has a press-fitting hole the shape and size of which allows all joint pins with different radiuses of curvature to be press-fit connected, is used.

Detailed explanation of the invention

Industrial application field

The present invention pertains to a transmission belt.

Prior art

An example of a conventional transmission belt is shown in Japanese Kokai Patent Application Hei 59[1984]-200838. The transmission belt shown therein is comprised of an endless chain formed by sequentially connected multiple link plates by means of pins, and a multiple load blocks attached to the chain. The chain passes through window parts with which the load blocks are provided, and the load blocks are maintained in a prescribed position by means of the pins. As the pins, a pair consisting of a rocker pin and a joint pin that have arc-shaped opposing faces at which they are capable of vibrating with respect to each other are used.

Problem to be solved by the invention

However, there is a problem with the conventional transmission belt as described above, in that a large amount of noise occurs during driving. In other words, the opposing faces of all of the rocker pins and joint pins have identical radiuses of curvature and they vibrate at the opposing faces, so the circumferential speed of the transmission belt varies with a fixed cycle. Therefore, when the transmission belt is wound on a pulley and rotated the noise level becomes high at a prescribed frequency.

To solve such a problem there is a method whereby the rocker pins and joint pins are provided with two or more radiuses of curvature, so that when the transmission belt is wound on a pulley the periodicity of the change in the circumferential speed of the transmission belt is reduced. Thus, the peak level of noise of a prescribed frequency can be reduced. However, because in this case multiple joint pins having different radiuses of curvature are used, multiple types of outside link plates which correspond thereto are required. In other words, when a joint pin is press-fitted into the press-fitting hole of the outside link plate and is crimped to assemble the chain and when there are multiple radiuses of curvature of the opposing faces of the joint pins, multiple outside link plates corresponding thereto must be provided. Therefore, multiple types of link plates must be manufactured, and when these are assembled the pins must be combined in a prescribed manner. Therefore, there is a problem in that productivity is poor. The objective of the present invention is to solve such problems.

Means to solve the problem

The present invention solves the aforementioned problems by using one type of outside link plate into which all joint pins can be press-fitted. In other words, the transmission belt of the present invention

has as its object a transmission belt which is comprised of an endless chain formed by sequentially connecting multiple link plates by means of rocker pins and joint pins that mutually contact at and are capable of vibrating at their opposing faces that are arc-shaped in cross section, and multiple load blocks that are attached to the chain, and for which two or more types of rocker pins and joint pins, for which the radiuses of curvature of the opposing faces differ, are used, and for which an outside link plate of the link plates which form the chain has a press-fitting hole that allows a joint pin to be press-fitted, the essence being that a type of the aforementioned outside link plate having a press-fitting hole the shape and size of which allows all joint pins with different radiuses of curvature to be press-fit connected is used.

Operation

Because two or more types of rocker pins and joint pins having different radiuses of curvature are provided, the periodicity of the change in the circumferential speed of the transmission belt when wound on a pulley is reduced. Although multiple types of joint pins thus are used, the outside link plate is a type with which all joint pins with different radiuses of curvature can be press-fit connected. Accordingly, it is possible to form the chain by means of just one type of outside link plate. Consequently, productivity is greatly improved.

Application example

Figures 2-5 show the transmission belt 50 of an application example of the present invention. This transmission belt 50 has two chains 13 comprised of multiple link plates 10 to which multiple load blocks 14 are assembled. The two chains 13 are inserted respectively from either side into a chain insertion part of the load blocks 14 (see Figure 5). As shown in Figure 6 and Figure 7, the chains 13 are

formed by connecting link plates 10a and 10b by means of connection pins 12a, 12b, 12c... Connection pin 12a is comprised of a rocker pin $12a_1$ and a joint pin $12a_2$, and rocker pin $12a_1$ and joint pin $12a_2$ are capable of vibrating at their opposing faces, which are arc-shaped in cross section. The radius of curvature of the opposing faces is r_1. Connection pin 12b basically has the same structure as connection pin 12a, but the radius of curvature of rocker pin $12b_1$ and joint pin $12b_2$ is r_2. Similarly, rocker pin $12c_1$ and joint pin $12c_2$ of connection pin 12c have a radius of curvature r_3. Thus, rocker pins and joint pins having the three radiuses of curvature r_1, r_2 and r_3 are arranged in random order. In addition, as shown in Figure 6, chain 13 is provided with two types of link plates, 10a and 10b; that is, the inside link plate 10a in the center part and the outside link plate 10b arranged farthest outside on chain 10. Inside link plate 10a has a pin hole having a basic circular shape (though having a noncircular part for the purpose of specifying a prescribed relative position for the rocker pin) which can receive both rocker pins and joint pins. On the other hand, outside link plate 10b has a pin hole with a roughly semicircular shape that corresponds to the cross-sectional shape of the joint pins. In other words, as shown in Figure 1, the pin hole 11 of outside link plate 10b is comprised of an arc-shaped part 11a with a radius of r_0, a linear part 11b on the opposite side thereof, and the arc-shaped parts 11c and 11d connecting these. r_0 has a value greater than that of the aforementioned r_1, r_2 and r_3, and the measurement t_0 in Figure 1 is smaller than the corresponding measurements t_1, t_2 and t_3 of the joint pins $12a_2$, $12b_2$ and $12c_2$ shown in Figures 8-10. All [of said joint pins] can be used with this one type of outside link plate 10b of chain 13. The size and shape of pin 11 of outside link plate 10b are set as described above, so when chain 13 is assembled press-fitting can be accomplished no matter which of the joint pins $12a_2$, $12b_2$ and $12c_2$ is inserted into pin hole 11.

As shown in Figure 11, this transmission belt 50 is used by winding it onto two pulleys 52 and 54. Pulleys 52 and 54 have fixed conical parts 52a and 54a, and movable conical parts 52b and 54b,

whereby opposing conical faces 32 and 34 and conical faces 32′ and 34′ are formed. At both the left and right ends of the load blocks 14 there are tapered faces 14a which make contact respectively with conical faces 32′and 34′ and conical faces 32 and 34 of the pulleys.

As described above, with this transmission belt 50 the radiuses of curvature r_1, r_2 and r_3 of the three types of rocker pins and joint pins differ from one another, so the peak noise level of a prescribed frequency component is reduced. Furthermore, outside link plate 10b of chain 13 is of one type, and the three types of joint pins $12a_2$, $12b_2$ and $12c_2$ respectively can be press-fitted thereto, so in comparison with the case wherein specific outside link plates corresponding to the three types of joint pins $12a_2$, $12b_2$ and $12c_2$ are manufactured, the manufacture of the outside link plate itself is simplified and when assembly is performed the assembly work is improved because it is not necessary to consider the matching of the external link plate and the joint pins.

Effect of the invention

As explained above, by means of the present invention joint pins having different radiuses of curvature can be press-fitted into a single type of outside link plate, so the manufacture of the outside link plate is simplified and the assembly work is made much more efficient because a selective matching [of the components] is not required.

Brief description of the figures

Figure 1 is a diagram showing the outside link plate according to the present invention. Figure 2 is a diagram showing a transmission belt of an application example of the present invention. Figure 3 is a cross section along the line III-III in Figure 2. Figure 4 is a front view of the transmission belt shown in Figure 3. Figure 5 is a cross section along the line V-V in Figure 3. Figure 6 is a plan view of the chain.

Figure 7 is a diagram of the side surface of the chain shown in Figure 6. Figures 8, 9 and 10 are respectively cross sections of different types of joint pins. Figure 11 is a diagram showing the transmission belt wound on a pulley.

Explanation of symbols

10	Link plate
11	Pin hole
$12a_1$, $12b_1$, $12c_1$	Rocker pin
$12a_2$, $12b_2$, $12c_2$	Joint pin
13	Chain
14	Load block

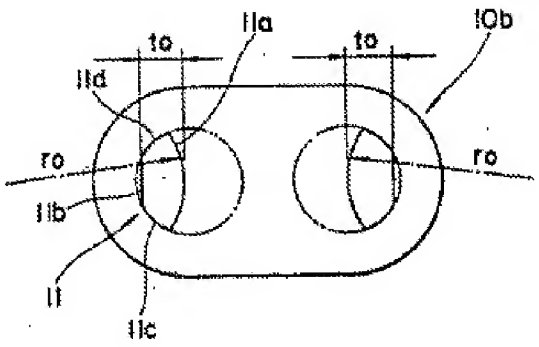

Figure 1

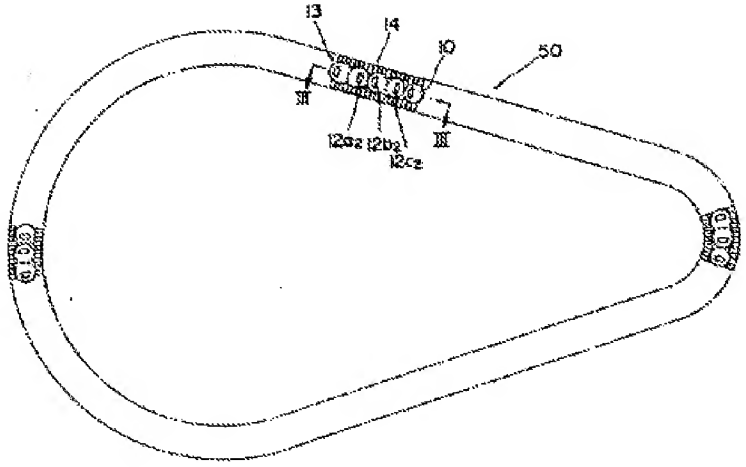

Figure 2

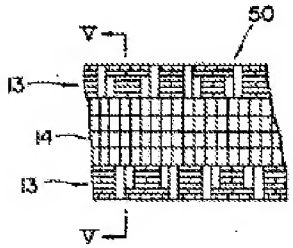

Figure 3

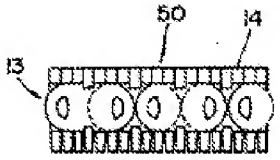

Figure 4

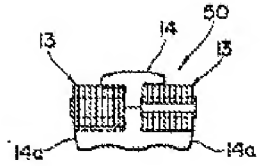

Figure 5

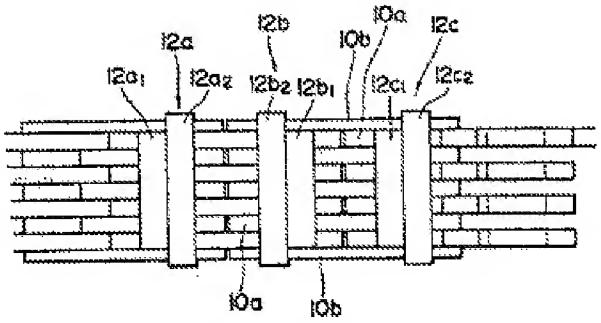

Figure 6

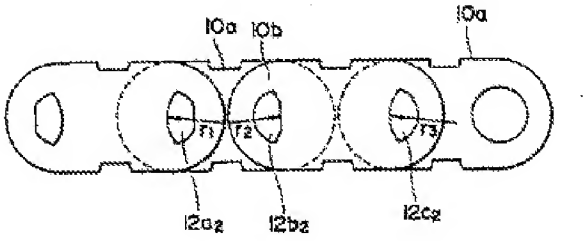

Figure 7

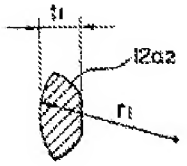

Figure 8

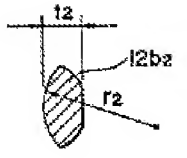

Figure 9

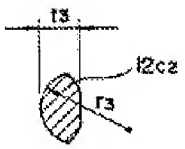

Figure 10

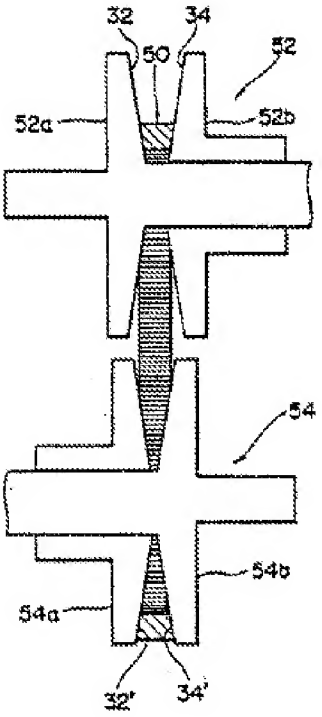

Figure 11